

AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application:

LISTING OF CLAIMS:

1. (CURRENTLY AMENDED) An image processing apparatus for decoding a compressed image data, the image data being divided ~~to~~ into a plurality of tiles, each of which is ~~a basic unit of process~~ in an encoding or decoding process, the image processing apparatus comprising:

a detector which detects an existence status of a ROI set within said compressed image data;

a determiner which determines whether each tile is a ROI tile that is composed ~~of~~ only of a ROI, a non-ROI tile that is composed ~~of~~ only of a non-ROI, or a ROI boundary tile composed of the ROI and the non-ROI based on said existence status of the ROI set detected by said detector; and

a processor which shifts ~~only~~ frequency transform ~~coefficient~~ coefficients of said ROI set within each tile determined to be a ROI tile to a lower bit side ~~for said ROI tile and said non-ROI tile determined by said determiner~~, and which shifts frequency transform coefficients of both the ROI set and a non-ROI set within each tile determined to be a ROI boundary tile to the lower bit side ~~for said ROI boundary tile determined by said determiner~~.

2. (CURRENTLY AMENDED) The image processing apparatus according to claim 1, wherein said detector detects the existence status of the ROI set based on a the frequency transform ~~coefficient~~ coefficients of said tile for every tile.

3. (CURRENTLY AMENDED) The image processing apparatus according to claim 1, wherein said processor shifts a the frequency transform ~~coefficient~~ coefficients to the lower bit side for a tile determined to be a ~~corresponding to non-~~ ROI ~~to lower bit side for a tile which abuts with said ROI boundary tile among said non-ROI tiles determined by said determiner.~~

4. (CURRENTLY AMENDED) An image processing apparatus for decoding a compressed image data, the image data being divided to a plurality of tiles, each of which is ~~as a basic unit of process in~~ an encoding or decoding process, the image processing apparatus comprising:

a detector which detects an existence status of a ROI set within said compressed image data;

a determiner which determines whether each tile is a ROI tile that is composed of only of a ROI, a non-ROI tile that is composed of only of a non-ROI, or a ROI boundary tile composed of the ROI and the non-ROI based on said existence status of the ROI set detected by said detector; and

a processor which performs a specific process for frequency transform coefficients of the ROI set and a non-ROI set within each tile for luminance component and color difference ~~component~~ components ~~of each tile determined by said determiner.~~

wherein said processor

shifts the frequency transform coefficients to a lower bit side for
luminance components and for color difference components for each tile
determined to be a ROI tile,

shifts the frequency transform coefficients to the lower bit side for color
difference components for each tile determined to a non-ROI tile,

shifts the frequency transform coefficients to a lower bit side for the
luminance components and for the color difference components
corresponding to the ROI set for each tile determined to be a ROI boundary
tile, and

shifts the frequency transform coefficients to the lower bit side for the
color difference components corresponding to the non-ROI set for each tile
determined to be the ROI boundary tile.

5. (CURRENTLY AMENDED) The image processing apparatus according to claim 4, wherein said detector detects the existence status of the ROI set based on a the frequency transform ~~coefficient~~ coefficients of said tile for every tile.

6. (CANCELED)

7. (CURRENTLY AMENDED) An image processing apparatus for decoding a compressed image data, the image data being divided to a plurality of tiles, each of which ~~a basic unit of process~~ in an encoding or decoding process, the image processing apparatus comprising:

a detector which detects an existence status of a ROI set within said compressed image data based on frequency transform coefficients of every tile;

a determiner which determines whether each tile is a ROI tile that is composed of only of a ROI, a non-ROI tile that is composed of only of a non-ROI, or a ROI boundary tile composed of the ROI and the non-ROI based on said existence status of the ROI set detected by said detector; and

a processor which performs a first process for each tile determined to be said ROI tile and said non-ROI tile ~~determined by~~ said determiner, and which performs a second process for each tile determined to be said ROI boundary tile ~~determined by~~ said determiner.

8. (CURRENTLY AMENDED) The image processing apparatus according to claim 7, wherein

said first process is shifting only the frequency transform ~~coefficient~~ coefficients of ~~said ROI set within each tile~~ to a lower bit side for each tile determined to be said ROI tile and ~~said non-ROI tile determined by said determiner~~, and

said second process is shifting the frequency transform coefficients of said ROI and non-ROI ~~within each tile~~ to the lower bit side for each tile determined to be said ROI boundary tile ~~determined by said determiner~~.

9. (CURRENTLY AMENDED) The image processing apparatus according to claim 7, wherein

said first process is shifting ~~only~~ the frequency transform ~~coefficient~~ coefficients of said ROI set to the lower bit side for luminance ~~component~~ components and color difference ~~component~~ components ~~of~~ for each tile determined to be said ROI tile ~~determined by said determiner~~ and shifting the frequency transform ~~coefficient~~ coefficients of said non-ROI set to the lower bit side for color difference ~~component~~ components ~~of~~ for each tile determined to be said non-ROI tile ~~determined by said determiner~~, and

said second process is shifting ~~only~~ the frequency transform ~~coefficient~~ coefficients of said ROI set to the lower bit side for luminance ~~component~~ components ~~of~~ for each tile determined to be said ROI boundary tile ~~determined by said determiner~~ and shifting the frequency transform coefficients of both the ROI set and the non-ROI set to the lower bit side for color difference ~~component~~ components of said ROI boundary tile.

10. (CURRENTLY AMENDED) A method of processing image for decoding a compressed image data, the image data being divided to a plurality of tiles, each of which is ~~a basic unit of process~~ in an encoding or decoding process, the method comprising steps of:

detecting an existence status of a ROI set within said compressed image data based on frequency transform coefficients of every tile;

determining whether each tile is a ROI tile that is composed ~~of~~ only of a ROI, a non-ROI tile that is composed ~~of~~ only of a non-ROI, or a ROI boundary tile

composed of the ROI and the non-ROI based on said existence status of the ROI set detected by ~~said detector~~ in said detecting step; and

performing a first process for said ROI tile and said non-ROI tile determined by in said determining step determiner, and ~~which performs~~ performing a second process for said ROI boundary tile determined by in said determining step determiner.

11. (NEW) The image processing apparatus according to claim 1, wherein the processor shifts the frequency transform coefficients for the ROI boundary tiles such that a bordering line around the ROI of the image data.

12. (NEW) The image processing apparatus according to claim 1, wherein the determiner determines whether each tile is a non-ROI tile bordering the ROI boundary tile, and wherein the processor shifts the frequency transform coefficients of the non-ROI set within the non-ROI tile bordering the ROI boundary tile to the lower bit side.

13. (NEW) The image processing apparatus according to claim 12, wherein the processor shifts the frequency transform coefficients of the non-ROI tile bordering the ROI boundary tile instead of the ROI boundary tile.

14. (NEW) The image processing apparatus according to claim 4, wherein the processor shifts the frequency transform coefficients for the color difference

components of the ROI boundary tiles and the non-ROI tiles such that the non-ROI of the image data is displayed in monochrome.

15. (NEW) The image processing apparatus according to claim 14, wherein the processor shifts the frequency transform coefficients for the color difference components of the ROI boundary tiles and the ROI tiles such that the ROI of the image data is displayed in color.

16. (NEW) An image decoding apparatus for decoding a tile of compressed image data, wherein the tile is one of a plurality of tiles of the image data, each tile being in an encoding or decoding process, the image decoding apparatus comprising:

a dynamic range analyzer configured to analyze a dynamic range of the tile, wherein the dynamic range is based on a number of bits representing transform coefficients of the tile;

a determiner configured to determine that the tile is a ROI tile that is composed of only a ROI set, a non-ROI tile that is composed only of a non-ROI set, or a ROI boundary tile composed of both the ROI and non-ROI sets based on the dynamic range of the tile analyzed by the dynamic range analyzer; and

a processor configured to reduce the transform coefficients of the tile based on whether the tile is determined to be the ROI tile, the non-ROI tile or the ROI boundary tile such that a boundary between ROI and non-ROI of the image data are visually distinguishable from each other.

17. (NEW) The image decoding apparatus according to claim 16, wherein the determiner is configured to

determine that the tile is the non-ROI tile when the dynamic range of the tile is less than a predetermined dynamic range threshold,

determine that the tile is the ROI tile when the dynamic range of the tile is equal to or greater than the predetermined dynamic range threshold and there are no transform coefficients of the tile that is less than the predetermined dynamic range threshold, and

determine that the tile is the ROI boundary tile when the dynamic range of the tile is equal to or greater than the predetermined dynamic range threshold and there is at least one transform coefficient of the tile that is less than the predetermined dynamic range threshold.

18. (NEW) The image decoding apparatus according to claim 17, wherein the processor is configured to reduce all transform coefficients of the tile by a predetermined reduction amount when the tile is determined to be the ROI boundary tile.

19. (NEW) The image decoding apparatus according to claim 18, wherein the predetermined reduction amount is equal to the predetermined dynamic range threshold.

20. (NEW) The image decoding apparatus according to claim 17,
wherein the determiner is further configured to determine that the tile is a
border non-ROI tile that is composed of only the non-ROI set and bordering at least
one ROI boundary tile, and

wherein the processor is configured to reduce all of the transform coefficients
of the tile by a predetermined reduction amount when the tile is determined to be the
border non-ROI tile.

21. (NEW) The image decoding apparatus according to claim 17,
wherein the transform coefficients of the tile include luminance and color
difference transform coefficients, and

wherein when the tile is determined to be the ROI boundary tile, the processor
is configured to

reduce the luminance transform coefficients of the ROI set of the tile by
a predetermined reduction amount,

reduce the color difference transform coefficients of the ROI set of the
tile by the predetermined reduction amount,

leave unchanged the luminance transform coefficients of the non-ROI
set of the tile, and

reduce the color difference transform coefficients of the non-ROI set of
the tile by the predetermined reduction amount.

22. (NEW) The image decoding apparatus according to claim 21, wherein the predetermined reduction amount is equal to the predetermined dynamic range threshold.

23. (NEW) The image decoding apparatus according to claim 21, wherein when the tile is determined to be the ROI tile, the processor is configured to reduce the luminance and the color difference transform coefficients of the tile by the predetermined reduction amount.

24. (NEW) The image decoding apparatus according to claim 21, wherein when the tile is determined to be the non-ROI tile, the processor is configured to leave unchanged the luminance transform coefficients of the tile, and to reduce the color difference transform coefficients of the tile by the predetermined reduction amount.

25. (NEW) The image decoding apparatus according to claim 17, wherein the transform coefficients of the tile include luminance and color difference transform coefficients, and

wherein the processor is configured to reduce one or both of the luminance and color difference transform coefficients of the tile such that the ROI of a corresponding image is displayed in full color and the non-ROI of the corresponding image is displayed in monochrome.